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Indian Standard

GUIDELINES FOR THE COMPILATION OF PERFORMANCE TEST SCHEDULES OF COMPLETE, FILLED TRANSPORT PACKAGES

PART I GENERAL PRINCIPLES

(First Reprint MAY 1997)

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Indian Standard

GUIDELINES FOR THE COMPILATION OF PERFORMANCE TEST SCHEDULES OF COMPLETE, FILLED TRANSPORT PACKAGES

PART I GENERAL PRINCIPLES

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Indian Standard
GUIDELINES FOR THE COMPILATION OF PERFORMANCE TEST SCHEDULES OF COMPLETE, FILLED TRANSPORT PACKAGES

PART I GENERAL PRINCIPLES

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 30 January 1981, after the draft finalized by the Transport Packages Sectional Committee had been approved by the Marine, Cargo Movement and Packaging Division Council.

0.2 This Indian Standard has been prepared in order to fulfil a need of organizations concerned with the compilation of test schedules for complete filled transport packages.

0.3 These test schedules can be as diverse as the journeys that packages undergo. Accordingly, this Indian Standard is intended to be guidelines for the compilation of appropriate test schedules, rather than to provide a rigid framework.

0.4 In order to facilitate international coordination on the subject this standard is based on ISO/DIS 4180/1 Complete, filled transport packages—General rules for the compilation of performance test schedules—Part 1 General Principles.

1. SCOPE

1.1 This standard (Part I) states the general principles involved in compilation of performance test schedules for complete, filled transport packages intended for use within any distribution system, whether transported by road, rail, sea, air or inland waterway, or by a combination of these modes of transport.

1.2 It also gives the factors to be considered in assessing the criteria of acceptance of such packages after they have been subjected to a package performance t[illegible]schedule.

2. TERMINOLOGY

2.0 For the purpose of this standard the following definitions shall apply.

2.1 Complete, Filled Transport Package — A package, including contents prepared for distribution.

2.2 Distribution System — All the operations which take place after a package has been filled and closed, including all handling, transport and storage operations up to and including delivery to the user.

2.3 Performance Test Schedule — A single laboratory test or series of tests, intended to ascertain the performance, under working conditions, of the subject under test.

2.4 Single-Test Schedule — A performance test schedule, compiled of tests all by the same method, if necessary, repeated with the same or different intensities and attitudes.

2.5 Multi-test Schedule — A performance test compiled from some or all of a series of tests.

3. HAZARDS

3.1 During distribution a transport package is subjected to a number of hazards which may cause damage.

3.2 These hazards are the result of a number of factors, the most important of which are:

a) the characteristics of the distribution system, and

b) the design of the package, that is its dimensions, mass and shape, and integral handling aids (for example handles), material and structure.

4. TESTS

4.1 Laboratory tests on transport packages aim to simulate or represent the distribution hazards.

4.1.1 Appropriate application of tests requires:

a) a knowledge of the stresses arising from these hazards;

b) the capability of reproducing these stresses by a particular test or, alternatively, of producing damage identical to that observed in practice.

4.1.2 The levels of intensity selected for the tests will depend on the factors stated in **3.2** and **4.1.1** and also on:

a) the degree of assurance that the package should give from the aspect of protection and containment of the contents or pollution of the environment;

b) the nature of the contents and the frequency and value of the consignment.

5. PERFORMANCE TEST SCHEDULES

5.1 Performance test schedules are used for a number of purposes:

a) For functional evaluations — will the package be adequate in performance?

b) For investigation — what causes damage and how can it be corrected?

c) For comparison — is package A better than package B?

d) For determination of compliance with statutes, regulations, or a chosen standard.

5.2 Multi-test schedules are generally used for functional evaluation in the context of a complete distribution system. Single test schedules are generally used for functional evaluations in the context of a particular hazard or for investigations.

Either type of schedule may be used for comparisons.

NOTE — In carrying out multi-test schedules or single-test schedules, they may be applied in their entirety to one or more of the packages under test or, alternatively, each test may be applied to separate replicates.

5.3 In compiling test schedules, in addition to the above factors, the following should be considered:

a) the time available for conditioning and testing;

b) the cost of testing relative to other factors;

c) the number of packages available for test; and

d) past experience of the particular packages or of similar packages.

6. TEST METHODS AND ORDER OF TESTS

6.1 Relevant tests shall be in accordance with the test methods as given in IS : 7031-1973* and IS : 7028 (Part I to IX). These test methods shall be used in compiling both single test and multi-test schedules.

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*Method of conditioning of complete, filled transport packages.

6.2 In compiling a multi-test schedule, the step-by-step procedure outlined in 9 should be used and tests selected placed in the order given below. Where exceptional circumstances require a different order, this shall be reported.

The recommended sequence is:

a) Conditioning for testing (*see* IS : 7031-1973)*

b) Stacking (*see* IS : 7028-1973 Part I)†

c) Impacts (*see* IS : 7028-1973 Part III‡ and IS : 7028-1973 Part IV)§

d) Climatic treatment (*see* IS : 7028-1974 Part VIII)||

e) Vibration (*see* IS : 7028-1973 Part II)¶

f) Stacking test (*see* IS : 7028-1973 Part I)†

g) Impacts (*see* IS : 7028-1973 Part III‡ and IS : 7028-1973 Part IV)§

NOTE 1 — A resonant frequency test shall be carried out between test (b), stacking and test (c), impacts, in order to discover whether resonant vibrations are likely to cause damage, when the complete, filled package is transported through the distribution system. However this test may be omitted if previous experience indicates that damage from resonant vibration is unlikely.

NOTE 2 — Other tests may be interposed in the test schedules as appropriate.

6.3 The number of individual tests applied to a package shall relate to its intended use, for single-trip or multiple-trip use.

6.4 Values of intensities of tests shall be as appropriate to the different modes of transport (road, rail, sea, and air) and storage.

6.5 Selection of Package Attitude

6.5.1 The package attitude(s) selected for use in a test shall be the attitude(s) of the package whilst it encounters the hazard(s) simulated or represented by the test, that is, the normal transit attitude(s).

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*Method of conditioning of complete, filled transport packages.

†Performance tests for complete filled transport packages: Part I Stack load test.

‡Performance tests for complete filled transport packages: Part III Horizontal impact strength, inclined plane and pendulum.

§Performance tests for complete filled transport packages: Part IV Vertical impact drop test.

||Performance tests for complete filled transport packages: Pert VIII Water spray test.

¶Performance tests for complete filled trnsport packages: Part II Vibration test.

6.5.2 Other considerations in the selection of package attitude(s), shall be:

a) No single sample of a package shall be subjected to an excessive number of individual tests in different attitudes, for example, for a single-trip package, a reasonable number of individual tests, might be five for impact tests and one for other tests; and

b) Duplication between horizontal and vertical impact tests, for example both tests applied to the same face, shall be avoided.

7. SELECTION OF TEST INTENSITIES

7.1 Test intensities should be selected according to the hazards of the distribution system, the nature of goods involved and the particular mode of transport used.

8. MODIFICATION OF BASIC VALUES OF INTENSITY

8.1 Test Intensity Modifying Factors

8.1.1 The 'basic' values of intensities are associated with common distribution systems and are based on consideration of average 'mass' and size of packages. Modifying factors may need to be applied to the basic values of intensity because of known features in the distribution system (which might be of a temporary nature), or features of the package (i.e., mass and size) which differ from those quoted above, or features of the package or contents known to lead to justifiable modification of the intensity.

8.2 Selection of Test Intensity Modifying Factors

8.2.1 Hard and fast rules cannot be used regarding the selection of modifying features as, although many may be due to facts known about the distribution, other may be due to human causes.

8.2.2 Other adjustments to test intensities may be required under certain circumstances, for example to allow for shortage of time available for testing or assorted loads in stacking.

8.3 Combination of Test Intensity Modifying Factors

8.3.1 The combination of test intensity modifying factors shall be based on consideration as to whether one factor has overriding significance. If no one factor has such significance, the value of the modifying factor selected shall be the highest value of the factor in the set considered.

8.3.2 In considering the cumulative effect of the factors selected, the total departure from the basic values, shall not exceed two steps in the appropriate preferred range of test intensity values, except in the instance of vertical impact drop height. This may be amended if specific knowledge of the distribution system exists, indicating that a change of a greater number of steps is appropriate.

8.3.3 Where a particular hazard is likely to occur during distribution, it may be necessary to increase the number of times a given test is performed.

9. COMPILATION OF TEST SCHEDULES

9.1 Consideration of the distribution system in terms of the simple elements of which it is constituted will determine the tests to be carried out in the test schedule.

9.2 The step-by-step procedure is as follows:

a) Identify the simple elements in the distribution system;

b) Decide what hazards these elements involve;

c) Decide which tests are necessary to represent or simulate these hazards (including, for example, decisions concerning appropriate conditioning, package attitude(s), interposed hazards, and number of impacts);

d) Decide what are the basic values of the test intensities associated with the particular package and distribution system combination concerned;

e) Decide what test intensity modifying factors, if any, should be applied to the normal values of test intensity; and

f) Place the tests thus identified into the order given in.

NOTE — If a particular hazard does not exist at a significant level, the test appropriate to this hazard may be omited.

10. DETERMINATION OF CRITERIA OF ACCEPTANCE

10.1 The criteria of acceptance for a complete, filled transport package may be determined by the reduction of quality of package, or its contents, or both the package and its contents.

10.1.1 The reduction of quality may be determined by:

a) the extent of loss of package contents;

b) the extent of deterioration of the package, or its contents, or both; and

c) whether the damaged package represents a hazard or potential hazard in subsequent distribution, including storage.

10.1.2 These factors shall be, if practicable, expressed in quantitative terms (*see* Appendix **A**).

10.2 In determining the extent of the damage that is acceptable the following factors shall be considered:

a) the unit value of the contents;

b) the number of units in the complete, filled transport package;

c) the number of complete, filled transport packages in the consignment;

d) the cost of distribution; and

e) whether the contents are:

   1) non-dangerous,

   2) dangerous to personnel; and

   3) hazardous to other commodities.

APPENDIX A

(*Clause* 10.1.2)

METHODS OF QUANTIFYING DAMAGE TO A PACKAGE AND/OR ITS CONTENTS

A-1. The extent of damage shall be quantified as follows:

a) by loss of content by number, volume or mass (loss by leakage is also related to time);

b) by damage to contents measured by appropriate test methods, for example moisture content of biscuits, the calibration of an instrument; and

c) by other damage to the package, or its contents, or both the package and contents by:

   1) changes in dimensions;

   2) dimensions of damage (for example, length of splits, area of corrosion); and

   3) time or cost of repair.

A-2. Scoring systems, in which score points are allotted for degrees of different types of damage and which take into consideration the relative importance of the different types of damage, shall be used to provide a quantitative assessment. Two examples are given in the Table 1.

TABLE 1 EXAMPLES OF QUANTIFICATION OF DAMAGE USING A SCORING SYSTEM

EXAMPLE	CONTENT	METHOD OF QUANTIFICATION	ALLOCATION OF SCORE POINTS	
			Bruise Diameter mm	Score Points
1	Apples	Measurement of bruise diameter	10	0
			10 to 15	1
			15 to 20	2
			20 to 25	4
			25 to 30	7
			30	11
			Severity of damage	Score Points
2	Radio sets	Assessment of severity of damage	No damage	0
			Damage requiring repair:	
			a) under normal pre-sale servicing;	1
			b) by return to factory	4
			Not worth repairing	10

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